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# **WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES**

**Including Columbia River Drainage in Canada**



**U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE**

Collaborating with  
**CALIFORNIA DEPARTMENT of WATER RESOURCES**  
and  
**BRITISH COLUMBIA DEPARTMENT of  
LANDS, FORESTS and WATER RESOURCES**

AS OF  
**APR. 1, 1978**

## TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

*COVER PHOTO: SOME OF THE DATA IN THIS REPORT HAVE BEEN RECEIVED THROUGH THE SOIL CONSERVATION SERVICE'S NEW SNOTEL SYSTEM WHICH TRANSMITS INFORMATION VIA THE SPACE AGED METEOR BURST METHOD FROM DATA SITES TO MASTER STATIONS LIKE THESE.*

### PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 510, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	Room 129, 2221 East Northern Lights Blvd., Anchorage, Alaska 99504
Arizona	Room 3U08, Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82602

### PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P.O. Box 388, Sacramento, California 95802 --- for British Columbia by the Ministry of the Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia V8V 1X5 --- for Yukon Territory by the Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory Y1A 3V1 --- and for Alberta, Saskatchewan, and N.W.T. by the Water Survey of Canada, Inland Waters Branch, 110-12 Avenue S.W., Calgary, Alberta T3C 1A6.



# **WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES**

## **Including Columbia River Drainage in Canada**

ISSUED

APRIL 1, 1978

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Corps of Engineers, Forest Service, National Park Service, NOAA, National Weather Service, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Unit, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Alaska, Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

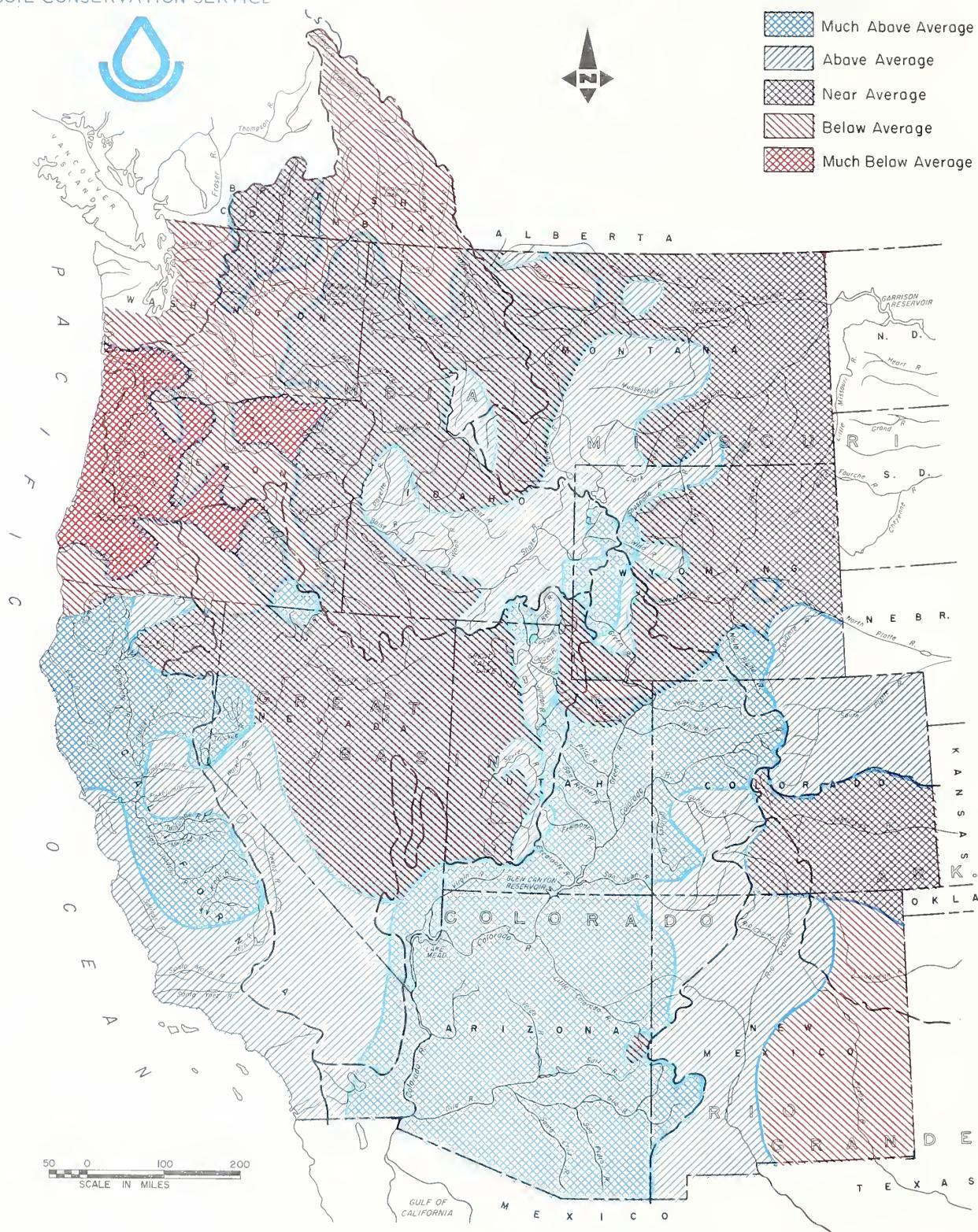
Data from California was supplied by the Chief, Water Supply Forecast and Snow Survey Unit, Department of Water Resources.

Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE



- [Light Blue Hatched Box] Much Above Average
- [Light Blue Box] Above Average
- [Dark Gray Hatched Box] Near Average
- [Light Gray Hatched Box] Below Average
- [Dark Red Hatched Box] Much Below Average



1978 SNOWMELT SEASON  
PROSPECTIVE STREAMFLOW  
AS OF APRIL 1, 1978

# WATER SUPPLY OUTLOOK

1978 SNOWMELT SEASON  
APRIL 1, 1978

PROSPECTS FOR ADEQUATE WATER SUPPLIES CONTINUE TO BE QUITE FAVORABLE IN MUCH OF THE WEST. THE SNOWPACK OVER PORTIONS OF THE PACIFIC NORTHWEST IS VERY LIGHT, HOWEVER, AND SHORTAGES MAY OCCUR. RESERVOIR STORAGE IS IMPROVING.

Parts of the Southwest and southern Rocky Mountains received above normal snowfall in March. As a result, adequate to abundant water supplies are forecast for that region.

Meanwhile, the Pacific Northwest received another month of warm and relatively dry weather. The area's snowpack did not reach a normal depth, and has begun to melt in advance of normal. On the Willamette basin the remaining snowpack is only 30 percent of normal, and two-thirds of last year's low level. Early winter rains did replenish much of the area's depleted reservoir storage, so water supplies should be adequate.

Elsewhere in the Columbia basin streamflow is forecast to be in the 70 to 90 percent of normal range on the upper mainstem in Canada, as well as from tributaries heading in the Cascades range of Washington and Oregon. Above normal runoff is expected from the Snake River and its central Idaho tributaries. Elsewhere in the basin streamflow should be near average.

Missouri River basin streams are forecast to yield normal to above average volumes, and reservoir storage is now at a normal level. Water supply prospects are good for virtually the entire basin. The only exceptions are the Marias River drainage in Montana and Wyoming's Popo Agie watershed which are forecast to flow at 89 and 83 percent of normal respectively.

Water supply prospects for most of the Platte River drainage are good to excellent. A very heavy snowpack has accumulated on the Park Range in Colorado on the North Platte headwaters. The 175 inches of snow and 75.7 inches of water measured at one data site is the most ever recorded in Colorado. Above normal yields are forecast from all streams except some central Wyoming tributaries to the North Platte. Reservoir storage is still poor in northern Colorado, but should improve as the heavy snowpack begins to melt.

The Arkansas River drainage snowpack is about normal for April 1, and streamflow is forecast to be in the near average range. Reservoir storage is still poor, however, and late season supplemental water may be in short supply.

The Rio Grande, Colorado, and Great Basin watersheds, as well as California rivers, have above to much above normal snowpacks. The series of heavy storms crossing the region which began in early January continued through mid March. The results are heavy snowpack and record setting runoff in Arizona. An excellent water supply season is in prospect for most of this area, and carryover storage for 1979 should be substantial.

A state by state summary follows:

## ALASKA

Snowfall during March was generally below normal across the state. The winter snow cover remains about as it was last month; slightly below to well below normal in most regions. Exceptions are the Brooks Range and Kenai Peninsula regions, which are still well above average. Snowmelt runoff predictions have been revised downward about 10 percent from last month at all forecast stations. The Chena River is expected to flow only 65 percent of normal for the April-July period and Ship Creek near Anchorage is down to 93 percent of its 15 year average.

## ARIZONA

Snow cover declined drastically the last half of March due to the warm temperatures and absence of heavy storms. Except for scattered patches, most of the snow below 8000 feet has melted. At the very highest elevations, however, much above average snow cover remains. However, the snowpack is far from the record 1973 amounts.

Snow cover now varies from 116 percent of average on the Gila Watershed to 132 percent on the Verde, with the Salt and Little Colorado at 126 and 122 percent of average respectively.

March precipitation was two to four times average at most mountain stations, with most being received early in the month.

Surface soil moisture is decreasing below 7000 feet, but will still yield high runoff

**SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS**

APRIL 1, 1978

MAJOR BASIN AND SUB - WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE	MAJOR BASIN AND SUB - WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
<b>MISSOURI BASIN</b>			<b>SNAKE BASIN</b>		
Jefferson	209	107	Snake above Jackson, Wyo.	307	121
Madison	205	108	Snake above Hiese, Idaho	291	124
Gallatin	189	107	Henry's Fork	266	107
Missouri Main Stem	158	112	Southern Idaho Tributaries	208	101
Yellowstone	160	111	Big and Little Wood	617	102
Shoshone	200	115	Boise	403	109
Wind	321	128	Owyhee	230	95
North Platte	202	131	Payette	307	102
South Platte	226	104	Malheur	205	70
<b>ARKANSAS BASIN</b>			Weiser	273	77
Arkansas	219	114	Burnt	145	75
Cucharas - Purgatoire	121	101	Powder	230	85
<b>RIO GRANDE BASIN</b>			Salmon	282	97
Rio Grande (Colo.)	336	93	Grande Ronde	150	80
Rio Grande (New Mexico)	195	111	Clearwater	167	81
Pecos	100	100			
<b>COLORADO BASIN</b>			<b>LOWER COLUMBIA BASIN</b>		
Green (Wyo.)	322	124	Yakima	235	77
Yampa - White	264	144	Umatilla	55	40
Duchesne	413	129	John Day	115	65
Price	583	150	Deschutes - Crooked	168	67
Upper Colorado	254	136	Hood	95	45
Gunnison	346	140	Willamette	60	30
San Juan	385	115	Lewis	130	59
Dolores	652	159	Cowlitz	198	75
Virgin	737	205			
Gila	140	116	<b>PACIFIC COASTAL BASIN</b>		
Salt	253	126	Puget Sound	133	58
Verde	430	132	Olympic Peninsula	88	47
<b>GREAT BASIN</b>			Umpqua - Rogue	105	45
Bear	252	115	Klamath	155	45
Logan	262	112	Trinity	409	143
Ogden	399	143			
Weber	169	111	<b>CALIFORNIA CENTRAL VALLEY</b>		
Provo - Utah Lake	298	137	Upper Sacramento	468	117
Jordan	178	124	Feather	465	129
Sevier	248	148	Yuba	440	132
Walker - Carson	460	150	American	472	118
Tahoe - Truckee	457	128	Mokelumne	655	131
Humboldt	224	122	Stanislaus	810	162
Lake Co. (Oregon)	200	50	Tuolumne	628	157
Harney Basin (Oregon)	210	95	Merced	684	171
Owens	1,090	218	San Joaquin	910	182
<b>UPPER COLUMBIA BASIN</b>			Kings	784	196
Columbia (Canada)	131	83	Kaweah	810	162
Kootenai	155	79	Tule	3,300	165
Clark Fork	160	88	Kern	1,090	218
Bitterroot	191	103			
Flathead	143	92			
Spokane	159	72			
Okanogan	223	94			
Methow	435	96			
Chelan	214	100			
Wenatchee	226	92			

Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.

Average is for 1958-72 period. California averages are for the period 1931-70. Based on Selected Snow Courses determined by Distribution within the Basin. Length of Record and Repetitive Monthly Measurement Schedules.

if a heavy storm develops in the next few weeks. Above 7000 feet the watershed is saturated, so very high runoff can be expected from moderate storms.

The warm and very heavy storms falling on a saturated watershed produced record March runoff on the Verde and Tonto Rivers. The Salt flow was the highest since 1905 and the Gila was the highest since 1941. The Salt River Project streams are predicted to produce 390,000 acre feet during April-May, making the total January-May runoff 2.26 million acre feet, slightly exceeding that received in 1973.

Although the April-May volume forecasts are 50-90 percent above average, the heavy runoff is over. Since much of the snow is gone and the probability of heavy storms declines in April, the river flows are generally expected to gradually taper off.

Except for San Carlos, Roosevelt, Lyman, and the Colorado River Reservoirs, all storage facilities are full. Roosevelt Lake, containing 90 percent of capacity, is expected to fill by the end of the month. San Carlos and Lyman Reservoirs are about one-fourth full, but will not come close to filling.

Water supplies will be adequate this year with a substantial amount of carryover storage available for next year.

## CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys and water supply forecasting in California, reports that above normal rain and snowfall during March in most river basins continued to increase water supplies throughout the state. In the southern Sierra, snowpack water content is now the third highest in 50 years, surpassed only by the big snow years of 1952 and 1969. Snowmelt runoff volumes during the next two months in San Joaquin Valley streams may cause severe water regulation problems if the normal time distribution of runoff is upset by either a period of sustained warm or cool temperatures.

Forecasts of snowmelt runoff for the April through July period range from about average for the Pit River to 286 percent of average for the Kern River. Runoff in San Joaquin Valley streams will exceed one and one-half times normal amounts in the Stanislaus through the Merced River Basins and over twice normal amounts in the San Joaquin through the Kern River Basins. The Kern River is forecast to produce the second highest snowmelt runoff in 50 years of record.

Snowpack measurements indicate some melting occurred at the lower and mid-elevations during March, but by month's end all watersheds had received a net increase in snow stored water and statewide snow water content was 150 percent of normal for April 1. NASA satellite imagery for the San Joaquin Valley watersheds showed a 45 percent increase in snowcovered area this year over the record dry conditions of last year. Snow surveys show this more extensive snowcovered area contains 157 percent more water content than last year - approaching a new record high.

The only places in California where precipitation during March was below average were around Lake Tahoe and in the extreme North Coast. All other areas were well above average for March, with highs ranging up to plus 400 percent of average in South Coastal basins where flooding resulted from the intense rainstorms. In the Central Valley, March precipitation ranged from about 125 percent of normal in the Sacramento Valley area to 200 percent of normal in the San Joaquin Valley.

Runoff during March was 175 percent of average throughout the state ranging from 136 percent in the North Coastal area to 632 percent in the South Coastal area. All San Joaquin Valley streams produced over 200 percent of average runoff except the Tuolumne River where runoff was 180 percent of average for the month. Efforts to dispose of excess runoff are underway in the San Joaquin Valley.

Reservoir storage in California increased by 10.3 million acre feet since April 1 of last year. March inflows accounted for 3.1 million acre feet and statewide storage is now back to normal. In the Central Valley, storage was very near the average for this date. Colorado River storage on April 1 in Lakes Powell, Mead, Mohave, and Havasu was 112 percent of average.

## COLORADO

The current snowpack should provide normal to excellent water supplies this summer for most of Colorado.

Carryover storage in the state's irrigation and municipal reservoirs is low, and probably can't be filled with one year's flow, but some improvement is expected by next year.

Surveys on April 1 indicate snowpack was slightly deficient on the eastern slope of the Front Range, but was excellent over the rest of the state.

A new snow record was set this year above Steamboat Springs on Buffalo Pass where the snowpack measured 175 inches deep containing 75.7 inches of water. This is the heaviest

**SELECTED STREAMFLOW FORECASTS** APRIL 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
<b>SASKATCHEWAN</b>				
St. Mary near Babb, Montana 1/	452	92	April-Sept.	
UPPER MISSOURI				
Beaverhead near Grant, Montana 2/	143	99	April-Sept.	54
Big Hole near Melrose, Montana	810	108	April-Sept.	
Madison near Grayling, Montana 3/	527	110	April-Sept.	313
Gallatin near Gateway, Montana	585	110	April-Sept.	
Sun at Gibson Dam, Montana 4/	545	92	April-Sept.	205
Belt near Monarch, Montana	145	118	April-Sept.	
Marias near Shelby, Montana 5/	500	89	April-Sept.	56
Missouri near Landusky, Montana 6/	5,000	106	April-Sept.	
near Williston, North Dakota 7/	12,700	108	April-Sept.	
S.Fk. Musselshell above Martinsdale, Montana	62	124	April-Sept.	
Milk at Eastern Crossing, Montana	235	90	April-Sept.	
Yellowstone at Yellowstone Lake Outlet, Wyo.	900	110	April-Sept.	387
at Corwin Springs, Montana	2,170	109	April-Sept.	
at Miles City, Montana 8/	6,750	106	April-Sept.	1,129
Clarks Fork near Belfry, Montana	705	116	April-Sept.	
Shoshone below Buffalo Bill Res., Wyoming 9/	1,000	121	April-Sept.	381
Wind near Dubois, Wyoming	150	147	April-Sept.	42
at Riverton, Wyoming 10/	810	122	April-Sept.	292
below Boysen Res., Wyoming 11/	1,070	106	April-Sept.	479
Bull Lake Creek near Lenore, Wyoming	175	96	April-Sept.	105
Little Popo Agie near Lander, Wyoming	40	83	April-Sept.	20
Tensleep near Tensleep, Wyoming	85	108	April-Sept.	
Medicine Lodge near Hyattville, Wyoming	23	110	April-Sept.	
Shell Creek near Shell, Wyoming	82	112	April-Sept.	55
Big Horn near St. Xavier, Montana 8/	2,100	114	April-Sept.	618
Tongue near Dayton, Wyoming	120	106	April-Sept.	107
No. Fork Powder near Hazelton, Wyoming	10.5	105	April-Sept.	7.7
<b>PLATTE</b>				
North Platte at Northgate, Colorado	310	129	April-Sept.	63
Encampment near Encampment, Wyoming	184	130	April-Sept.	55
Deer Creek at Glenrock, Wyoming	19.5	75	April-Sept.	30
Laramie Riv. & Pioneer Canal, nr Woods, Wyo. 12/	150	118	April-Sept.	67
Big Thompson at Drake, Colorado 13/	120	112	April-Sept.	
Clear at Golden, Colorado 14/	150	118	April-Sept.	
St. Vrain at Lyons, Colorado 15/	85	113	April-Sept.	
Cache LaPoudre near Fort Collins, Colorado 16/	290	117	April-Sept.	
<b>ARKANSAS</b>				
Arkansas at Salida, Colorado 17/	340	109	April-Sept.	
Cucharas near LaVeta, Colorado	9	90	April-Sept.	
Purgatorie at Trinidad, Colorado	35	92	April-Sept.	
<b>RIO GRANDE</b>				
Rio Grande near Del Norte, Colorado 18/	400	86	April-Sept.	
at Otowi Bridge, New Mexico 19/	600	114	March-July	
Conejos near Mogote, Colorado 20/	175	95	April-Sept.	
El Vado Res., Inflow, New Mexico	250	132	March-July	
Pecos at Pecos, New Mexico	40	98	March-July	
<b>UPPER COLORADO</b>				
Colorado, Grandby Res. Inflow, Colorado 21/	300	132	April-Sept.	
near Dotsero, Colorado 22/	1,850	129	April-Sept.	
near Cameo, Colorado 23/	3,100	131	April-Sept.	
near Cisco, Utah 24/	4,215	149	April-July	535
Lake Powell Inflow, Arizona 25/	9,780	142	April-July	1,130
Roaring Fork at Glenwood Springs, Colorado 26/	800	112	April-Sept.	
Uncompahgre at Colona, Colorado	190	142	April-Sept.	

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

**SELECTED STREAMFLOW FORECASTS** APRIL 1, 1978

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
<b>UPPER COLORADO (continued)</b>				
Gunnison, Blue Mesa Res. Inflow, Colorado 27/ near Grand Junction, Colorado 28/	925 1,600	117 135	April-Sept.	
Dolores at Dolores, Colorado	325	140	April-Sept.	
Green at Warren Bridge, Wyoming at Green River, Wyoming 29/	410 1,340	125 135	April-Sept.	165 279
Flaming Gorge Res. Inflow, Utah 27/ at Green River, Utah 30/	1,390 3,842	118 135	April-July	233 883
Big Sandy near Big Sandy, Wyoming	60	105	April-Sept.	26
Yampa at Steamboat Springs, Colorado near Maybell, Colorado	400 1,300	146 144	April-Sept.	
Little Snake near Dixon, Wyoming	470	156	April-Sept.	55
White near Meeker, Colorado	400	136	April-Sept.	
Strawberry at Duchesne, Utah 40/ Duchesne near Tabiona, Utah 31/ at Randlett, Utah 30/	78 94 250	125 90 94	April-July	10.1 19.2 13.1
Lakefork below Moon Lake, Utah 32/	62	89	April-July	30
Uinta near Neola, Utah	75	85	April-July	70
Whiterocks near Whiterocks, Utah	50	86	April-July	24
Price, Scofield Res. Inflow, Utah 33/	54	159	April-July	4.2
Cottonwood near Orangeville, Utah 34/	54	117	April-July	10.4
San Juan, Navajo Res. Inflow, New Mexico 27/ near Bluff, Utah 35/	750 1,203	126 141	April-July	
Animas at Durango, Colorado	575	136	April-Sept.	123
<b>LOWER COLORADO</b>				
Virgin near Virgin, Utah	76	158	April-June	25
Little Colorado above Lyman, Arizona	8	103	April-June	1
Gila near Solomon, Arizona	68	153	April-May	10
Frisco at Clifton, Arizona	35	148	April-May	5
Salt at Intake, Arizona	275	193	April-May	55
Tonto above Roosevelt, Arizona	25	298	April-May	4
Verde above Horseshoe Dam, Arizona	90	167	April-May	24
<b>GREAT BASIN</b>				
Bear at Utah-Wyo. State Line at Harer, Idaho	105 330	94 111	April-July	41 35
Smith's Fork near Border, Wyoming	155	134	April-Sept.	27
Thomas Fork near Wyo.-Ida. State Line	44	138	April-Sept.	3.8
Logan near Logan, Utah 36/	128	114	April-July	34
Ogden, Pine View Res. Inflow, Utah 27/	145	132	April-June	13.5
Weber near Oakley, Utah	105	105	April-June	32
Provo near Hailstone, Utah 37/	100	98	April-July	32
Strawberry Res. Inflow, Utah	65	141	April-July	5.7
Utah Lake Net Inflow, Utah	260	125	April-July	
Big Cottonwood near Salt Lake City, Utah	43	119	April-July	18.8
Beaver near Beaver, Utah	28	140	April-July	6.1
Sevier near Hatch, Utah near Gunnison, Utah	63 50	158 128	April-July	10.6 15.4
So. Fork Humboldt near Elko, Nevada	80	121	April-July	
Humboldt at Palisades, Nevada	220	114	April-July	65
Truckee at Farad, California 38/	335	125	April-July	51
East Carson near Gardnerville, Nevada	265	146	April-July	43
West Carson at Woodsfords, California	75	144	April-July	12
East Walker near Bridgeport, California 39/	140	206	April-August	9
West Walker near Coleville, California	245	169	April-July	35
Donner and Blitzen near Frenchglen, Oregon	56	105	April-Sept.	
Silvies near Burns, Oregon	58	78	April-Sept.	12.3
Chewaucan near Paisley, Oregon	65	82	April-Sept.	12.2
Deep above Adel, Oregon	51	75	April-Sept.	
Bidwell near Ft. Bidwell, California	10.6	92	April-July	
Owens below Long Valley Res., California	131	158	April-July	28

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

**SELECTED STREAMFLOW FORECASTS APRIL 1, 1978**

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
<b>UPPER COLUMBIA</b>				
Columbia at Birchbank, British Columbia 40/ a.	38,900	84	April-Sept.	31,583
at Grand Coulee, Washington 40/ a.	60,400	88	April-Sept.	41,805
below Rock Island, Washington a.	67,800	90	April-Sept.	43,659
Kootenai below Libby Dam near Libby, Montana	6,250	84	April-Sept.	3,976
at Leonia, Idaho	7,600	84	April-Sept.	4,910
Blackfoot near Bonner, Montana	1,000	97	April-Sept.	
So.Fk. Flathead nr Columbia Falls, Montana 40/	2,330	98	April-Sept.	1,255
Flathead at Columbia Falls, Montana 40/	6,000	93	April-Sept.	3,180
near Polson, Montana 40/	7,180	94	April-Sept.	3,600
Clark Fork above Missoula, Montana	1,800	99	April-Sept.	573
near Plains, Montana 40/ a.	11,700	93	April-Sept.	5,237
at Whitehorse Rapids, Idaho a.	12,900	92	April-Sept.	
Bitterroot near Darby, Montana	675	116	April-Sept.	242
Priest near Priest River, Idaho 41/ a.	790	90	April-July	
Pend Oreille below Box Canyon, Washington a.	14,500	91	April-Sept.	6,041
Kettle near Laurier, Washington	1,850	99	April-Sept.	1,145
Spokane at Post Falls, Idaho 42/	2,750	91	April-Sept.	
Similkameen near Nighthawk, Washington a.	1,420	94	April-Sept.	645
Okanogan near Tonasket, Washington a.	1,570	91	April-Sept.	708
Methow near Pateros, Washington a.	1,070	104	April-Sept.	
Stehekin at Stehekin, Washington	920	102	April-Sept.	494
Chelan at Chelan, Washington 43/	1,300	104	April-Sept.	599
Wenatchee at Peshastin, Washington	1,710	96	April-Sept.	839
<b>SNAKE</b>				
Snake above Palisades Res., Wyoming 44/	3,350	128	April-Sept.	1,037
near Heise, Idaho 45/	4,970	126	April-Sept.	
near Blackfoot, Idaho 46/	5,000	120	April-July	
at Weiser, Idaho a.	6,610	101	April-Sept.	
Grey's above Palisade, Wyoming	580	149	April-Sept.	90
Salt above Palisade, Wyoming	520	142	April-Sept.	121
Henry's Fork near Ashton, Idaho 47/	740	110	April-Sept.	
Teton near St. Anthony, Idaho	485	110	April-Sept.	
Big Lost near Mackay, Idaho 48/	165	90	April-Sept.	
Little Lost near Howe, Idaho	37	90	April-Sept.	
Portneuf at Topaz, Idaho	110	118	March-Sept.	
Oakley Res. Inflow, Idaho	30	103	March-Sept.	
Salmon Falls Creek near San Jacinto, Idaho	84	105	March-Sept.	
Little Wood above High 5 Crks, Idaho	105	112	April-Sept.	
Big Wood, Inflow to Magic Res., Idaho 49/	330	110	April-Sept.	
Bruneau near Hot Springs, Idaho	240	106	March-Sept.	
Boise near Boise, Idaho 50/	1,825	113	April-Sept.	
Owyhee near Owyhee, Nevada 51/	62	91	April-July	
Owyhee Res. Net Inflow, Oregon 27/	336	101	April-Sept.	97
Malheur near Drewsey, Oregon	61	85	April-Sept.	
Payette near Horseshoe Bend, Idaho 52/	2,100	114	April-Sept.	
Weiser above Crane Creek, Idaho 40/	530	102	March-Sept.	
Burnt near Hereford, Oregon 40/	34	103	April-Sept.	
Powder near Sumpter, Oregon	50	91	April-July	
Eagle above Skull Creek, Oregon	179	94	April-Sept.	
Imnaha at Imnaha, Oregon	327	106	April-Sept.	
Salmon at Whitebird, Idaho a.	7,470	107	April-Sept.	
Lostine near Lostine, Oregon	117	94	April-Sept.	
Grande Ronde at LaGrande, Oregon	92	58	April-Sept.	88
Clearwater at Spalding, Idaho a.	7,050	82	April-Sept.	
<b>LOWER COLUMBIA</b>				
Yakima at CleElum, Washington 53/	775	80	April-Sept.	
near Parker, Washington 54/	1,640	76	April-Sept.	802
Naches near Naches, Washington 55/	800	90	April-Sept.	

Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

**SELECTED STREAMFLOW FORECASTS APRIL 1, 1978**

STREAM AND STATION	FORECASTS THIS YEAR		Forecast Period	Last Year's Flow In (1,000 A.F.)
	Flow In (1,000 A.F.)	Percent of Average		
<b>LOWER COLUMBIA (continued)</b>				
Walla Walla, So. Fork near Milton, Oregon	56	85	April-Sept.	
Umatilla at Pendleton, Oregon	79	55	April-Sept.	
John Day, Middle Fork at Ritter, Oregon	86	80	April-Sept.	
North Fork at Monument, Oregon	432	80	April-Sept.	
Crooked near Post, Oregon	78	85	April-Sept.	
Deschutes at Benham Falls, Oregon <u>40/</u>	431	79	April-Sept.	
Columbia at The Dalles, Oregon <u>40/</u> a.	65,800	90	April-June	35,577
at The Dalles, Oregon <u>40/</u> a.	80,700	90	April-July	42,939
at The Dalles, Oregon <u>40/</u> a.	93,700	90	April-Sept.	54,130
McKenzie near Vida, Oregon	833	66	April-Sept.	
Santiam, South, at Waterloo, Oregon	436	70	April-Sept.	
North, at Mehama, Oregon <u>40/</u>	599	69	April-Sept.	
Clackamas at Estacada, Oregon	526	67	April-Sept.	
Willamette at Salem, Oregon <u>40/</u>	3,460	70	April-Sept.	
Lewis at Ariel, Washington <u>56/</u>	900	68	April-Sept.	1,040
Cowlitz at Castle Rock, Washington <u>57/</u>	2,230	80	April-Sept.	2,172
<b>NORTH PACIFIC COASTAL</b>				
Dungeness near Sequim, Washington	125	76	April-Sept.	
Umpqua, No., near Toketee Falls, Oregon <u>40/</u> a.	140	84	April-Sept.	
Rogue at Raygold, Oregon	668	75	April-Sept.	529
Klamath Lake, Net Inflow, Oregon	456	85	April-Sept.	290
Trinity at Lewiston, California	885	143	April-July	113
<b>CALIFORNIA CENTRAL VALLEY <u>40/</u></b>				
Sacramento, Inflow to Shasta, California	2,060	116	April-July	798
Feather near Oroville, California	2,530	136	April-July	397
Yuba at Smartville, California	1,300	120	April-July	198
American, Inflow to Folsom Res., California	1,650	125	April-July	233
Cosumnes at Michigan Bar, California	175	133	April-July	13
Mokelumne, Inflow to Pardee Res., California	650	130	April-July	106
Stanislaus, Inflow to Melones Res., California	1,100	153	April-July	120
Tuolumne, Inflow to Don Pedro Res., California	1,930	162	April-July	275
Merced, Inflow to Excheque Res., California	1,100	181	April-July	128
San Joaquin, Inflow to Millerton Lake, Calif.	2,560	215	April-July	262
Kings, Inflow to Pine Flat Res., California	2,350	202	April-July	274
Kaweah, Inflow to Terminus Res., California	550	204	April-July	62
Tule, Inflow to Success Res., California	120	203	April-July	5
Kern, Inflow to Isabella Res., California	1,200	286	April-July	91
<b>ALASKA</b>				
Yukon at Eagle, Alaska	24,850	70	April-July	
at Ruby, Alaska	59,000	86	April-July	
Porcupine near Fort Yukon, Alaska	6,000	86	April-July	
Salcha near Salchaket, Alaska	519	72	April-July	428
Little Chena near Fairbanks, Alaska	63	67	April-July	83
Chena at Fairbanks, Alaska	364	65	April-July	493
Ship Creek near Anchorage, Alaska	55	93	April-July	94
So.Fk.Campbell at Canyon Mouth nr Anchorage, AK	12.4	96	April-July	19.9

a. National Weather Service forecast

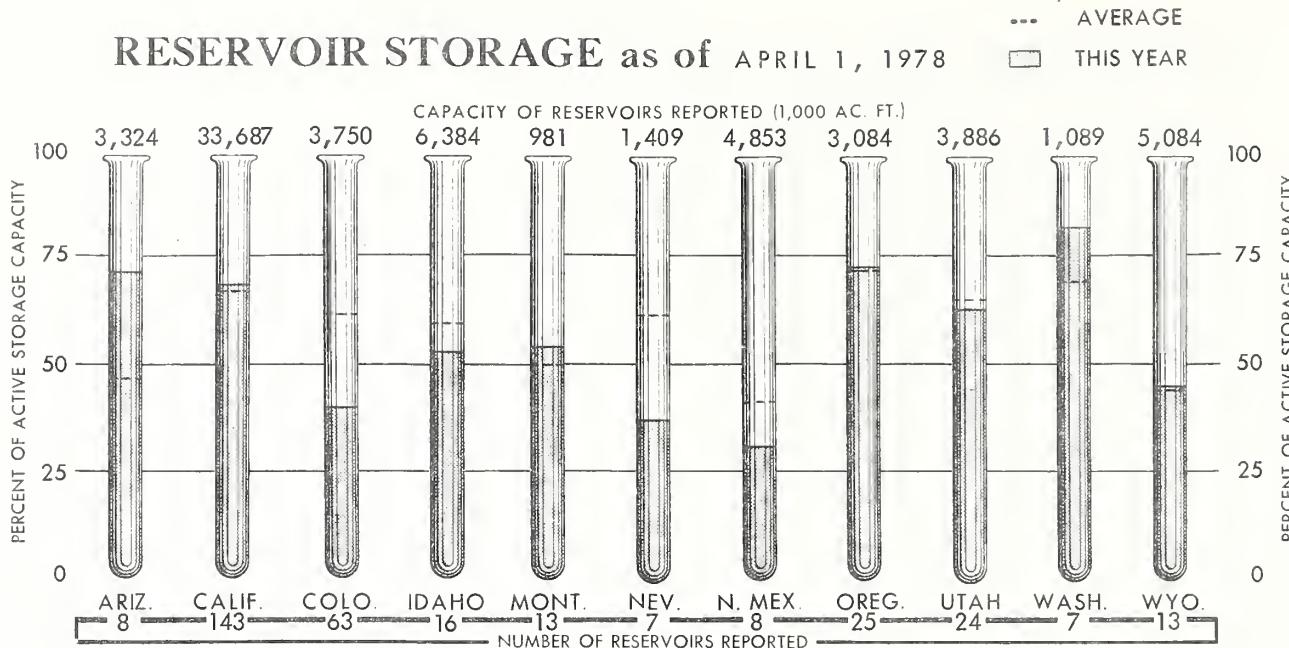
Forecasts in California provided by Department of Water Resources.

Average is for 1958-72 period except California. California is computed for 1921-70 period.

Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.

# RESERVOIR STORAGE as of APRIL 1, 1978



snowpack ever officially recorded in Colorado. Several of the surrounding snow courses are at maximum of record. As a result, the Yampa River and adjacent drainages should have excellent water supplies this summer. If warm weather should persist for several days, high water can be expected.

The Colorado River mainstem and the southern tributaries also have an excellent snowpack, which has increased slightly more than normal during March. Summer streamflow should be excellent. The Gunnison River should also produce more than adequate water supplies this summer.

An early month storm dropped huge amounts of snow on the San Juan Basin in southwest Colorado, raising the snowpack in this area to 137 percent of normal on the Animas, 159 percent on the Dolores, and 115 percent on the San Juan. Some high water could also be expected in this area.

The Rio Grande Basin, or San Luis Valley, had a light snowpack all year, but last month's snowfall improved conditions. Streams should flow near the 15 year average if spring weather is normal.

The mainstem of the Arkansas should flow near normal. However, southern tributaries will contribute less than normal flows. Carryover storage is poor and soil moisture conditions only fair. Some summer water shortages can be expected.

Most of the snow courses had reached their maximums by April 1; however, the very high elevation courses could gain snow during April.

## IDAHO

Next summer's irrigation water supply is expected to be generally adequate throughout Idaho.

Seasonal streamflow forecasts vary from a low of 82 percent of average for Clearwater River at Leonia to 153 percent of normal for Montpelier Creek near Montpelier.

Water shortages may occur on some smaller low elevation streams, such as the Palouse, with no storage facilities and a well below normal snowpack.

Snowfall during March was below average throughout the state. Normally, maximum accumulation occurs near the first of April; however, in 1978 the maximum was near the first of March on many snow courses. Accumulated snow water content varies from a low of 23 percent of average on the Palouse drainage to 131 percent of normal on the Montpelier Creek watershed.

Valley precipitation averaged below normal for March while temperatures averaged well above normal.

Warm temperatures during the past 30 days resulted in considerable low and middle elevation snowmelt and increased soil moisture considerably.

Streamflow forecasts for the Snake River call for 126 percent of average at Heise, but only 101 percent of normal at Weiser. The Portneuf River is predicted to yield 118 percent of its normal, while inflow to Magic reservoir is forecast at 110 percent of average. The Clearwater is only expected

## STORAGE IN LARGE RESERVOIRS

APRIL 1, 1978

BASIN AND NAME OF RESERVOIR	CAPACITY (1,000 A.F.)	STORAGE (1,000 A.F.)	STORAGE PERCENT AVERAGE	BASIN AND NAME OF RESERVOIR	CAPACITY (1,000 A.F.)	STORAGE (1,000 A.F.)	STORAGE PERCENT AVERAGE
<b>UPPER MISSOURI</b>							
Belle Fourche	185	160	136	Chelan	676	156	87
Boysen	550	283	123	Coeur d'Alene	225	278	160
Buffalo Bill	373	152	112	Duncan	1,400	35	39
Canyon Ferry	2,043	1,499	93	Flathead	1,791	696	88
Fort Peck	19,140	15,660	118	Hungry Horse	3,428	1,605	74
Garrison	24,790	11,595	80	Kootenay	787	185	116
Hebgen	377	195	94	Lake Koocanusa	5,694	1,567	-
Keyhole	192	143	178	Lower Arrow	2,691	547	418
Lake Francis Case	5,816	2,755	68	Noxon Rapids	335	255	128
Lake Sharpe	1,900	21	1	Pend Oreille	1,155	260	54
Oahe	23,630	14,626	89	Roosevelt	5,232	1,843	101
Tiber	1,347	619	103	Upper Arrow	4,400	689	134
Bighorn Lake	1,356	774	97				
<b>PLATTE</b>							
So. Platte in CO (31)	1,067	661	79	Cougar	155	65	87
City of Denver (7)	604	301	66	Detroit	300	111	62
Colo-Big Thompson (3)	718	165	39	Green Peter	270	97	59
Glendo	784	450	112	Hills Creek	200	103	85
Pathfinder	1,016	493	118	Lookout Point	337	109	62
Seminoe	1,010	249	85	Prineville	153	149	121
				Wickiup	200	190	101
				Yakima Res. (5)	1,066	882	120
<b>ARKANSAS</b>							
Conchas	273	107	58				
John Martin	621	6	6				
Turquoise	130	47	-				
Pueblo	354	2	-				
<b>RIO GRANDE</b>							
Elephant Butte	2,195	241	61	American Falls	1,125	1,381	138
New Mexico Res. (4)	578	80	87	Anderson Ranch	423	111	48
<b>UPPER COLORADO</b>							
Blue Mesa	830	243	77	Arrowrock	287	278	120
Flaming Gorge	3,749	1,998	126	Brownlee	980	402	92
Navajo	1,696	959	80	Cascade	653	316	104
Powell	25,002	14,528	172	Dworshak	2,016	407	216
Starvation	152	147	-	Jackson	847	326	63
<b>LOWER COLORADO</b>							
Havasu	619	568	102	Lucky Peak	278	93	78
Mead	26,159	21,281	126	Owyhee	715	550	108
Mohave	1,810	1,618	97	Palisades	1,200	286	35
Salt River Res. (4)	1,755	1,612	141	Warm Springs	191	102	86
San Carlos	949	270	135				
Verde River Res. (2)	318	315	199				
<b>GREAT BASIN</b>							
Bear	1,421	802	82				
Lahontan	291	175	80				
Rye Patch	157	57	54				
Sevier Bridge	236	98	84				
Strawberry	274	147	123				
Tahoe	732	111	24				
Utah	884	738	113				
Willard Bay	193	151	111				
<b>UPPER COLUMBIA</b>							
Chelan	676	156	87				
Coeur d'Alene	225	278	160				
Duncan	1,400	35	39				
Flathead	1,791	696	88				
Hungry Horse	3,428	1,605	74				
Kootenay	787	185	116				
Lake Koocanusa	5,694	1,567	-				
Lower Arrow	2,691	547	418				
Noxon Rapids	335	255	128				
Pend Oreille	1,155	260	54				
Roosevelt	5,232	1,843	101				
Upper Arrow	4,400	689	134				
<b>LOWER COLUMBIA</b>							
Cougar	155	65	87				
Detroit	300	111	62				
Green Peter	270	97	59				
Hills Creek	200	103	85				
Lookout Point	337	109	62				
Prineville	153	149	121				
Wickiup	200	190	101				
Yakima Res. (5)	1,066	882	120				
<b>SNAKE</b>							
American Falls	1,125	1,381	138				
Anderson Ranch	423	111	48				
Arrowrock	287	278	120				
Brownlee	980	402	92				
Cascade	653	316	104				
Dworshak	2,016	407	216				
Jackson	847	326	63				
Lucky Peak	278	93	78				
Owyhee	715	550	108				
Palisades	1,200	286	35				
Warm Springs	191	102	86				
<b>PACIFIC COASTAL</b>							
Clair Engle	2,448	1,202	63				
Clear Lake	440	197	80				
Nacimiento	350	309	157				
Ross	1,053	729	95				
Upper Klamath	584	455	78				
<b>CALIFORNIA CENTRAL VALLEY</b>							
Almanor	1,308	758	98				
Berryessa	1,602	1,315	87				
Bullards Bar	961	2,842	104				
Folsom	1,010	618	99				
Isabella	570	254	152				
McClure	1,026	477	80				
Millerton	521	422	127				
Oroville	3,538	2,842	104				
Pine Flat	1,002	545	91				
Shasta	4,552	3,982	108				

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.

to contribute 82 percent of its average, but the Salmon is forecast at 107 percent. Most other Idaho streams are expected to flow at 90 to 110 percent of their normal amounts.

Runoff during March was near median with reservoir storage increasing at a near normal rate. Though storage is below average, all major reservoirs are expected to fill by the beginning of the irrigation season if normal spring weather prevails.

## MONTANA

The mountain snowpack remains generally near or above average, even though all areas showed very small snowfall amounts during March. Many low elevations recorded substantial melt for this early in the season.

Some areas report low snowpack, including portions of the Beaverhead River drainage in southwest Montana, portions of the Stillwater River and Red Lodge-Rock Creek drainages near Red Lodge and most of northwest Montana.

Above average snowpack was measured in the southern part of the Bitterroot River drainage, Headwaters of the Big Hole River, most of the Madison River drainages, and the upper portions of the Yellowstone River drainage. All of the smaller mountain ranges in central Montana also report above average amounts of water stored in the snowpack.

Above normal temperatures the last two weeks of March have melted most of the heavy prairie snowpack.

The total runoff from April through September is forecast to be near average over much of the state. Below average runoff is expected from lower elevations.

In the Columbia River drainage all streams in the Kootenai River System, western parts of the Flathead River Basin and streams flowing into the lower reaches of the Clark Fork will yield slightly below normal amounts.

The extreme headwaters of the Beaverhead River and the lower portion of the Marias River in the Missouri River drainage are also forecast to have below average runoff.

In the Yellowstone River drainage, a low volume of inflow to Cooney reservoir is forecast.

Most streams entering the Yellowstone River upstream from Billings are expected to have above average runoff.

Irrigation water supplies are expected to be average or above in most areas unless the above normal temperatures and below normal precipitation trend continues.

Above average streamflow is expected for most streams flowing into the Bitterroot River west of the divide. Missouri River stream systems predicted to have above average runoff are the Madison and Gallatin Rivers, upper portions of the Milk River, and all streams draining central mountain ranges.

## NEVADA

An above average water supply is forecast for Nevada water users this summer. Streamflow forecasts indicate above average flows for the season; however, reservoir storage is still much below normal.

The high elevations accumulated average to above average increases in snowpacks during March, while warmer than usual temperatures melted the snow at lower elevations. This resulted in the March streamflows being above average. The Mt. Charleston area near Las Vegas had the highest percentage of snowpack in the state - 271 percent of average, but other basins in the state were near average.

The Eastern Sierra snowpacks range from 163 percent on the Walker to 122 percent on the Tahoe Basin. The Truckee Basin showed 133 percent with the Carson 137 percent. And the Upper Humboldt Basin had 120 percent snowpack while the Lower Humboldt indicated 128 percent.

Streamflow forecasts in the Eastern Sierras are as follows: the Lake Tahoe Rise is forecast at 1.8 feet, assuming the gates are closed. This is the height the water surface will rise if the gates remain closed from April 1 to the date of the highest water elevation this summer.

The Truckee River is forecast to flow 125 percent of its normal volume from April 1 through July 31. The Carson River near Carson City is forecast to flow nearly 150 percent of its average. The West Walker River near Coleville is forecast at 169 percent of normal and the East Walker at 213 percent - the highest in the Eastern Sierra's when compared to their averages. The Humboldt River at Palisade is forecast for 114 percent of average. The tributaries of the Humboldt are forecast to contribute from 80 to 140 percent of their 15 year averages.

Reservoir storage is still much below normal. Lake Tahoe has usable storage of 111,000 acre feet compared to an average of 456,000 acre feet. Lahontan contains 175,000 acre feet for 80 percent of its average. Seven major reservoirs in the state, Wild Horse, Rye Patch, Tahoe, Boca, Lahontan, Topaz and Bridgeport contain 448,000 acre feet or only 50 percent of

average and 31 percent of their total usable capacity.

## NEW MEXICO

Snowfall during March improved the water supply outlook for New Mexico materially. The current snowpack is above normal in all basins of the state and near normal on the Rio Grande Basin in Colorado. Some extremely high snowfall was recorded in the Chama area during the month.

Three locations in the state report good soil moisture conditions: the Carlsbad, Chama, and Tucumcari areas. The rest of the areas report fair soil moisture.

All streams fed by melting snow should yield flow at least normal quantities. The Rio Chama is forecasted at 132 percent of the 15-year average. The mainstem of the Rio Grande and its tributaries should provide near normal summer water supplies; however, carryover storage is only 65 percent of normal. Elephant Butte contains 241,000 acre feet, compared to a normal of 394,000 acre feet.

Inflow to Navajo should be 750,000 acre feet which is 126 percent of normal. Water supplies should be adequate. The Pecos is forecast at 98 percent of normal. Some shortages could exist.

Carryover storage in Conchas Reservoir on the Canadian River is 107,000 acre feet, which is 58 percent of average. Some shortage can be expected unless heavy spring precipitation is received.

## OREGON

Most Oregon water users will experience adequate water supplies this summer. However, irrigators dependent on direct diversion west of the Cascades and in the counties along the Columbia and the Upper Grande Ronde, may experience shortages as early as June.

Oregon's snow cover conditions deteriorated drastically during March. Normally, the snowpack increases during the winter until it reaches a maximum on April 1. The maximum this year was March 1, as the snowpack decreased this past month due to warm temperatures and lack of precipitation. Currently, 107 of the 200 snow courses in the state have water contents equal to, or less than, last year's snowpack. The snow cover in the Cascades varies from a minimum of no snow, on lower elevation watersheds, to 25 percent on most of the Willamette, and up to 55 percent on the Upper Rogue River. Southeast Oregon has the best snow cover, where it is normal on the Owyhee and above normal in the Steens and the Trout Creek

Range. The Blue Mountain snowpack is 35 to 65 percent of normal, while the Wallows, as higher elevations, are near normal.

Winter precipitation, November through March, has been normal to above normal throughout the state. However, much fell as rain and the snowpack did not build at its usual rate. Mountain soils are wetter than normal due to the melting snowpack and winter rains, so spring precipitation should yield more than normal runoff.

Forecasts of spring and summer volumes of streamflow for representative Oregon streams range from a low of 58 percent of average on the Grande Ronde River to the normal quantity expected during the April through September period from the Owyhee. The Deschutes is expected to yield 79 percent of its average, while most other Oregon streams are forecast to flow at from 75 to 85 percent of their normal quantities.

Reservoir storage is now near normal for April 1, due to the early snowmelt runoff. Twenty-five principal irrigation reservoirs were storing 2,259,000 acre feet of water on April 1. The normal for this date is 2,230,000 acre feet.

## UTAH

Utah's 1978 water supply outlook ranges from below average in Uintah Basin to an average supply for most of the rest of the state, and no shortages are expected, except where reservoir storage is abnormally low.

Early March storms increased snow water content as much as six to eight times the normal amounts resulting in high improvements to the snowpack in southern Utah. Snowpacks now range from 105 percent of the April 1 average for the Upper Green to 205 percent on the higher areas of the Virgin River.

The southern half of the state has the best snow cover. Most watersheds have from 150 to 170 percent of their April 1 averages.

The snowpack on watersheds in northern Utah range from 145 percent on the Ogden to 105 percent on the Upper Green.

March precipitation at mountain stations varied from about 57 percent of average at Lakefork Mountain on the south slope of the Uinta's to 803 percent at Little Grassy in the southwest corner of the state. Other areas of heavy precipitation were Big Flat and Merchant Valley on the head of the Beaver River, Pine Creek above Fillmore, Webster Flat on Coal Creek and Vernon Creek above Vernon. Most other areas had average to above average except the head of the Provo River, Chalk Creek, Bear Rivers and Spanish Fork River. Most valley soils locations are now well primed while mountain soils under

the snowpack are improved, but still below average.

Storage in 24 of Utah's key irrigation reservoirs is now 96 percent of the April 1 average and 15 percent less than last year at this time.

Streamflow forecasts improved as much as 116 percent in southern Utah after very heavy increases to the snowpack and decreased as much as 20 percent on some northern Utah streams due to below average increases to the snowpack in that area. Forecasts now range from 78 percent of average on Chalk Creek near Coalville to 223 percent for the Sevier near Circleville. Some representative forecasts are the Bear River at 94 percent, the Logan River at 114 percent, and Pineview Inflow at 132 percent, Lost Creek 82 percent, and Chalk Creek 78 percent. Weber River is forecast at 105 percent, the Provo River 98 percent, and Utah Lake Inflow 125 percent.

Uintah Basin streams are forecast to yield from 91 percent on Rock Creek to 85 percent on Uinta River, while the Virgin River is now expected to flow 158 percent of average and Coal Creek 161 percent.

All areas are expected to have adequate water supplies except those where water users depend on storage water and last year's carryover storage was very low.

## WASHINGTON

There has been a general decrease in the snowpack during the past 30 days, resulting in a lowering of water supply forecasts from 5 to 15 percent throughout the state.

Despite the warm, dry weather in March, Washington water users can expect near average supplies this summer.

Only on the Chelan and Entiat drainages is the snowpack normal or above average as of April 1. Along the Lower Columbia Drainage, the snow cover ranges from 42 percent of normal on the Mill Creek Drainage to 75 percent of average on the Cowlitz River. Most drainages in the state do have more snow this year than last year at this time, although some watersheds on the Puget Sound and the Olympic Peninsula have less than last year's record low snowpacks.

Streamflow forecasts have been revised downward from last month and now range from a low of 65 percent of normal to a high of 108 percent of average. The Upper Columbia is now forecast at 84 percent of normal, but by the time it flows through the state will have improved to 90 percent of average. The Chelan and Methow will contribute about 104 percent of their norms. The Yakima at Parker is only expected to yield 76 percent

of its average. Most other rivers are forecast to flow at 90 to 95 percent of their average rates, and water users should not experience shortages this year.

Most of the reservoirs are storing more water than normal for April 1. The five Yakima irrigation reservoirs have 20 percent more water in storage than normal for this time of year. Lake Roosevelt is at a near average level while Ross has 95 percent of normal.

## WYOMING

Excellent to average streamflows are forecast for Wyoming water users this spring and summer. Snowpacks have been diminished by warm temperatures but still remain average to above average. The shortages of runoff experienced last summer are not expected this year.

March weather conditions included above normal temperatures and heavy snowfalls in some isolated areas. The result is snowpacks diminished by 5 to 15 percent from last month.

Northeastern Wyoming snowpacks are only 29 percent of average. The Bighorn Basin has near average conditions while the rest of the state has above average snow accumulations. The Little Snake River drainage snowpack is heaviest, at 143 percent of normal.

Lower elevation precipitation for March was generally less than 50 percent of normal except for the extreme southwestern area. One-third of the stations reported less than 0.25 inches of liquid precipitation. However, seasonal totals (since October 1, 1977) remain at 30-40 percent above normal in western Wyoming to 25-50 percent below normal along the east slope of the Wind River Range and in southeastern Wyoming.

Average to excellent streamflow volumes are forecast for the snowmelt runoff season. The northeast corner of the state is an exception where flows will be much below normal. Deer Creek at 75 percent of normal and Little Popo Agie at 83 percent are also low, while the Upper North Platte and Snake River Basin drainages are as high as 149 percent of average.

Much above normal volumes are reported for all reservoirs in the Black Hills region. Other reservoirs across the state have near to above normal storage while the Snake River reservoirs still remain low. Jackson Lake holds 63 percent of its normal and Palisades Reservoir is only 36 percent of its April 1 average.

# EXPLANATION of STREAMFLOW FORECASTS

All flows are observed flows except as adjusted for: 1/ Storage change in Lake Sherburne. 2/ Storage change in Lima and Clark Canyon reservoirs. 3/ Storage change in Hebgen Lake. 4/ Storage change in Gibson Reservoir and measured diversions. 5/ Storage change in Two Medicine, Four Horns, Lake Francis and Swift reservoirs. 6/ Storage change in Canyon Ferry and Tiber reservoirs. 7/ Changes as indicated in (6/), (8/), plus storage change in Fort Peck. 8/ Storage change in Boysen, Buffalo Bill, Bull Lake and Yellowtail reservoirs. 9/ Storage change in Buffalo Bill Reservoir plus Heart Mountain diversion. 10/ Storage change in Pilot Butte and Bull Lake reservoirs plus Wyoming canal diversion.

11/ Changes indicated in (10/) plus storage change in Boysen Reservoir. 12/ Plus diversions to Cache LaPoudre. 13/ Plus by-pass to power plants. 14/ Minus diversion thru Gumlick Tunnel. 15/ Storage change in Price Reservoir. 16/ Minus diversions from North Platte, Laramie and Colorado rivers plus measured diversions above station. 17/ Storage change in Clear Creek, Twin Lakes and Turquoise reservoirs minus diversions from Colorado River. 18/ Storage change in Rio Grande, Santa Maria and Continental reservoirs. 19/ Storage change in El Vado and Abiquiu reservoirs. 20/ Storage change in Platboro Reservoir.

21/ Storage change in Grandby Reservoir as furnished by U.S.B.R. plus diversions by Adams Tunnel and Grand River Ditch. 22/ Changes as indicated in (21/) plus diversions thru Roberts, Gumlick and Moffat tunnels and storage change in Dillon, Homestake, Williams Fork, Green Mountain and Willow Creek reservoirs. 23/ Changes indicated in (22/) and (26/). 24/ Storage change in Blue Mesa Reservoir. 25/ Changes indicated in (24/), (30/) and (35/) and storage change in Lake Powell. 26/ Diversions to Arkansas River plus storage change in Ruedi Reservoir. 27/ (Inflow record as computed by U. S. Bureau of Reclamation.) 28/ Storage change in Taylor, Blue Mesa and Morrow Point reservoirs. 29/ Storage change in Fontenelle Reservoir. 30/ Storage change in Flaming Gorge Reservoir.

31/ Plus diversion through Duchesne Tunnel. 32/ Storage change in Moon Lake Reservoir. 33/ Storage change in Scofield Reservoir. 34/ Storage change in Joe's Valley Reservoir. 35/ Storage change in Navajo Reservoir. 36/ Plus U. P. & L. Co. tailrace and Logan, Hyde Park and Smithfield canals. 37/ Minus diversions thru Duchesne Tunnel and Weber-Provo Canal. 38/ Storage change in Lake Tahoe and Boca reservoirs (Forecast by Truckee Basin Committee.) 39/ Storage change in Bridgeport Reservoir. 40/ Corrected for major upstream impairments -- represents simulated natural flow conditions.

41/ Storage change in Priest Lake. 42/ Storage change in Coeur d'Alene Lake and diversions by Spokane Valley Farms Co. and Rathrhum Prairie canals. 43/ Storage change in Lake Chelan. 44/ Storage change in Jackson Lake. 45/ Storage change in Jackson Lake and Palisade reservoirs. 46/ Storage change in Jackson Lake, Palisades, Island Park, Henry's Lake, Grassy Lake plus diversions between Heise and Blackfoot. 47/ Storage change in Henry's Lake and Island Park reservoirs. 48/ Storage change in Mackay Reservoir and diversion in Sharp Ditch. 49/ Combined flow Big Wood near Bellevue and Camas Creek near Blaine. 50/ Storage change in Arrowrock, Anderson Ranch and Lucky Peak reservoirs.

51/ Storage change in Wild Horse Reservoir. 52/ Storage change in Cascade and Deadwood reservoirs. 53/ Storage change in Keechelus, Kachess and CleElum reservoirs plus diversion by Kittitas Canal. 54/ Changes indicated in (52/) plus storage change in Bumping and Rimrock Lakes plus diversion by Roza, Union Gap, New Reservation, Old Reservation and Sunrise canals. 55/ Storage change in Bumping and Rimrock Lakes and diversions by Tieton, Selah Valley, Wapatox canals and City of Yakima. 56/ Storage change in Merwin, Yale and Swift reservoirs. 57/ Storage change in Mayfield Reservoir.

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